Does Access to Capital Affect Cost Stickiness? Evidence from China

Abstract

We study the effect of limited access to capital on firm cost stickiness, using data from a large sample of Chinese private firms over 1998-2007. Our results show that on average SG&A costs are anti-sticky. For firms in regions with lower levels of financial development, SG&A costs have lower sensitivity to sales increases, and exhibit lower stickiness. Overall our findings suggest access to capital as an important determinant of cost stickiness.

JEL classification: M41; G32

Keywords: Cost Stickiness; Access to Capital; Adjustment Costs; Financial Development

1. Introduction

In a perfect market, firms adjust their costs symmetrically according to activity changes (e.g., Horngren et al., 2012). However, previous empirical studies focus on publicly traded firms and document that costs are sticky – costs increase more when activity rises than decrease when activity falls by the same amount (e.g., Anderson et al., 2003; Calleja et al., 2006; Chen et al., 2012; Banker et al., 2013). The implicit assumption in these studies is that firms can keep unutilized resources, which is generally true for those firms that have good access to capital (Reid and Smith, 2000; Holzhacker et al., 2015). However, this assumption may not hold for privately held and small firms with limited access to capital, and for such firms it is uncertain whether cost stickiness is prevalent. Using a unique, large sample from China that includes mainly privately-held small firms, we extend previous literature by documenting that on average selling, general, and administrative (SG&A) costs are anti-sticky for small private firms, and firms with better access to capital have stronger cost stickiness or weaker anti-stickiness.

We consider financing costs associated with limited access to capital as an important type of adjustment costs that affect cost behaviour (Doms and Dune, 1998; Abowd and Kramarz, 2003). As established in the literature, asymmetric adjustment costs[1], as well as deliberate managerial decisions, are the main explanations of cost stickiness (Banker et al., 2011). When firms reduce their capacity as sales decrease, they incur adjustment costs such as severance pay to terminate employment contracts, social pressures from media and regulators, and costs of fire sale of equipment and machines. When firms expand capacity in response to sales increase, they incur adjustment costs such as the costs of hiring and training new employees, the transaction costs of

[1] We define adjustment costs as any costs incurred by firms when managers change capacity according to demand shocks, but adjustment costs and SG&A costs are different concepts. Adjustment costs may not necessarily be included in SG&A costs, but adjustment costs affect managerial decisions when managers adjust SG&A costs according to activity changes.

purchasing equipment and machines, and financing costs to obtain external financing (Bresnahan and Ramey, 1994; Doms and Dune, 1998; Cooper et al., 1999; Abowd and Kramarz, 2003; Nilsen and Schiantarelli, 2003).[2]

In particular, firms with limited access to capital have higher costs of securing external financing during the capacity expansion periods[3], which increases the upward adjustment costs. When activity decreases, firms with limited access to capital may suffer more decrease in the present value of revenue generated by a marginal capacity, as these firms have higher opportunity cost of capital and thus higher discount rates compared to firms with better access to capital. Therefore, we hypothesize that limited access to capital not only reduces contemporary capacity expansions associated with sales increases, but also weakens the degree of cost stickiness when sales decrease.

To test our hypotheses, we exploit the regional financial development index in China, which is compiled by the National Economic Research Institute of China (Fan et al., 2010). Our approach is based on the findings of prior studies that financial development levels have a major impact on firms' access to capital (e.g., Demirgüç-Kunt and Maksimovic, 1998; Rajan and Zingales, 1998; Love, 2003). This approach has the following advantages. First, the credit market in China is dominated by state-owned banks, so macro-level factors such as monetary policy, government intervention, and financial development have significant effects on firms' access to capital (Li et al., 2009). Second, regional financial development is relatively exogenous to firm-level managerial decisions, whereas prior studies that use firm-level proxies for access to capital

[2] Deliberate managerial decisions focus on managers' behavior such as: their perception of future sales activity (Banker et al., 2012a), incentive for earnings manipulation (Dierynck et al., 2012; Kama and Weiss, 2013), and empire building (Chen et al., 2012).
[3] Firms with limited access to capital also receive fewer amounts of loans and have stricter loan conditions such as restricted convents and debt maturity structure. These indirectly increase the firms' external financing costs as well. For simplicity, we only discuss direct external financing costs in this paper.

usually suffer a more serious endogeneity problem (Hadlock and Pierce, 2010).[4] Third, we focus on inter-region variations within one country, and hence, our sample is not subject to contamination of different accounting rules, taxation, and investor protection across countries.

Our sample is extracted from the Annual Industrial Survey Database complied by the National Bureau of Statistics of China (NBSC). After dropping observations with a few standard criterions in cost stickiness literature, which we discuss in detail in the third section, our final sample consists of 616,796 firms over the period of 1998-2007. Although 99.8% of the firms in our sample are not publicly traded, firms covered in our sample contribute to more than 90% of the industrial GDP of China. This database is suitable for our study because firms covered in the database do not have access to equity markets.[5] Firms in our sample are also relatively smaller than firms studied in most prior cost stickiness literature. While bank loans are a major source of external financing for our sample firms, small firms in our sample usually have severe asymmetric information and weak bargaining power in the negotiations of bank loans. As a result, it is more difficult and costly for privately-held small firms to obtain external capital (e.g., Fazzari et al., 1988; Peterson and Rajan, 1997; Whited and Wu, 2006). This problem is more pronounced for firms located in regions with lower levels of financial development. In particular, state-owned banks dominate the credit market in China, and they have stringent credit rationing and strong lending discrimination against privately held small firms (Bhabra et al., 2008; Li et al., 2009).

Consistent with our hypotheses, our empirical results indicate that firms in regions with lower financial development not only have less contemporary capacity expansion associated with sales growth, but also have weaker cost stickiness. Our results also show that on average SG&A

[4] Our study is similar to Banker et al. (2013) who use the country-level employment protection legislation as an exogenous proxy for downward labor adjustment costs.
[5] Dierynck et al. (2012) document cost stickiness in Belgian private firms, but they eliminate small firms from their sample and do not focus on the effect of access to capital on cost stickiness.

costs are anti-sticky. One possible explanation for the prevalence of cost anti-stickiness is that the overall level of financial development in China is relatively low over our sample period, and most of firms in our sample are private and small. In other words, on average our sample firms have limited access to capital.

While we interpret the results as evidence for the importance of access to capital in determining cost behavior, there are two alternative explanations. First, China's unique legal, economic institutions and industry characteristics may be the driver of cost stickiness. To test this explanation, we analyse public firms in China that are in the same industries as our sample firms. The alternative explanation should apply to these firms, and we would expect to find cost anti-stickiness for these firms. However, we find that costs are sticky for these firms, suggesting that China's unique legal, economic institutions and industry characteristics are not likely to be the driver of the cost anti-stickiness in our sample. Second, it could be that the nature of being private alone is the driver of cost anti-stickiness. If this alternative explanation holds, we would expect anti-stickiness for all private firms. However, we find that for larger private firms, who have better access to capital, costs are sticky, suggesting that being private alone is not likely to be the driver of the cost anti-stickiness we document.

Our results are robust to a variety of different specifications, including different proxies for access to capital. In particular, we also take advantage of the 2004 Chinese macroeconomic regulation as an exogenous shock to firms' external financing costs, and find that firms have a lower degree of cost stickiness in 2004 relative to 2003, and the effect is more pronounced for the five industries that are more heavily influenced by the regulations on lending.

Our study contributes to cost stickiness literature by showing that access to capital, a factor that was largely ignored before, affects cost behavior and managerial cost commitment decisions.

Anderson et al. (2003) and Banker et al. (2013) use asset intensity, employee intensity, and the strictness of country-level employee protection laws as proxies for different adjustment costs, and find these proxies to be positively related to cost stickiness. Based on a large sample of private firms in China, we find that both the contemporary capacity expansion associated with activity increase and cost stickiness will be reduced when firms have more limited access to capital. Although we focus on small and private firms, these firms play important roles in various economies. For instance, small and medium enterprises in the US account for more than half of the private sector output, employ more than half of private sector workers, and provide 60%-80% of new jobs each year (Ou, 2006). Similarly, small and medium enterprises in China account for about 60% of the market value of all industrial final products produced (Li, 2009). Mitchell and Reid (2000) argue that prior studies predominantly focus on management accounting in large firms and have long ignored the specifics of management accounting in small and medium-sized enterprises (SMEs). Our paper provides empirical evidence that SMEs exhibit different cost stickiness from large public firms due to the limited access to capital.

Our paper also sheds light on cost stickiness in China, an increasingly important economy in the world. The majority of the prior management accounting literature studies public firms in developed countries, while developing countries such as China, Brazil, Russia and Latin American countries are rarely studied (López and Hiebl, 2015). Furthermore, the management accounting practice of SMEs may be different between China and developed countries. Allen et al. (2005) find that it is difficult to explain Chinese economy growth by theories build upon developed economies. Anderson et al. (2003), and Calleja et al. (2006) document cost stickiness for US, UK, French, and German public firms, while Dall Via and Perego (2013) study SMEs in Italy and find evidence of cost anti-stickiness. Recently, Banker et al. (2011) examine public firms in China and

find cost stickiness for Chinese public firms. Our paper extends the previous cost stickiness literature by studying a large sample of Chinese private firms with various abilities to get access to capital.

The remainder of the paper proceeds as follows. Section 2 reviews the literature and develops our hypothesis. Section 3 discusses our sample, data, and empirical methods. Main empirical evidence and additional tests are presented in Section 4. Section 5 concludes.

2. Literature and hypotheses

In a perfect market without frictions, the change in costs should be symmetric to the change in the level of activities (Noreen, 1991). However, Cooper and Kaplan (1992) and Noreen and Soderstrom (1997) question the validity of the assumption of cost symmetry and argue that costs can be asymmetric due to the adjustment costs and other market frictions. Consistent with this predication, Anderson et al. (2003) study a sample of US public firms and find that when activity changes by the same amount, SG&A costs increase more when activity rises than decrease when activity falls. Following Anderson et al. (2003), Calleja et al. (2006) and Banker et al. (2011) document cost stickiness in the samples of public firms in other countries.

Prior studies of sticky costs have relied on informal argument of adjustment costs and deliberate managerial decisions. Similar optimal decision rules have been formally modelled in the economics literature on dynamic factor demand (e.g., Hamermesh, 1989; Bentolila and Bertola, 1990; Caballero, 1991; Abel and Eberly, 1994; Hamermesh and Pfann, 1996; Palm and Pfann, 1997). In the equilibrium of a dynamic factor model, adjustment costs of marginal unit resource must be equal to the present value of cash flows generated by the marginal unit resource during its tenure (Bentolila and Bertola, 1990; Abel and Eberly, 1994). One key insight from the dynamic

factor demand literature is that the optimal decision rules are generally asymmetric (e.g., Bentolila and Bertola, 1990; Caballero, 1991). For example, if the adjustment cost of resource reduction exceeds the adjustment cost of resource expansion, then managers will be reluctant to cut capacity when activity decreases. The same logic would apply for the cost stickiness analysis. When activity increases, managers will expand capacity as long as the net present value of the marginal capacity is positive. For example, an employee will be hired if the present value of the revenue generated by him is greater than the sum of the hiring costs and employee's salary. Conversely, managers will reduce capacity when the net present value of the marginal capacity is negative, including the adjustment costs. For example, a marginal employee will be fired if the present value of the revenue generated by him is less than the sum of firing costs and employee's salary. Managers may also consider the possibility that sales will recover in subsequent periods. So the present value of the expected hiring costs in the future may be added in the present value of the revenue generated by the marginal employee, when managers make the firing decision. The costs of securing external financing become important when firms have limited access to capital. Firstly, high costs of securing external financing would increase a firm's opportunity cost of capital, that is, the discount rate in the NPV calculations. And the high discount rate would further reduce the present value of the revenue generated by the marginal capacity. Secondly, when firms need external financing to fund capacity expansion or keep unutilized capacity, the adjustment costs associated with financing would be higher. We argue that the costs of external financing should be considered as an adjustment cost in analyzing cost stickiness.

2.1. Limited access to capital and adjustment costs

Previous literature suggests that firms incur adjustment costs to change the levels of labor forces or the capacity of equipment and machines (e.g., Bresnahan and Ramey, 1994; Doms and Dune, 1998; Cooper et al., 1999; Abowd and Kramarz, 2003; Nilsen and Schiantarelli, 2003). And adjustment costs may differ for capacity reduction and for capacity expansion, causing costs to change asymmetrically (e.g., Abowd and Kramarz, 2003; Anderson et al., 2003; Ye and Duenyas, 2007).

It is worth noting that prior studies of cost stickiness implicitly assume that firms have sufficient access to capital (e.g., Anderson et al., 2003). Under this assumption, the studies focus on other types of adjustment costs and expect the adjustment costs to be smaller for capacity expansion than for capacity reduction (e.g., Jaramillo et al., 1993; Pfann and Palm, 1993; Abowd and Kramarz, 2003). Consistent with this expectation, previous empirical studies examine publicly traded firms and show evidence that costs are sticky (Anderson et al., 2003; Calleja et al., 2006). However, these studies examine publicly traded firms, which are generally larger and more established. For such firms the implicit assumption is more likely to hold, and adjustment costs are more likely to be higher for capacity reduction than for capacity expansion, consistent with the expectation of stickiness. Consequently, it remains unclear whether costs exhibit the same asymmetry for firms with limited access to capital.

Firms with limited access to capital have difficulty in securing external financing and usually pay high costs of capital. As such, limited access to capital not only restrains capacity expansion when activity increases, but also reduces cost stickiness when activity decreases. Below, we illustrate the role of limited access to capital using labor hiring as an example:

1. Higher capacity expansion costs: to make hiring decisions associated with activity increases, managers trade the present value of revenue generated by the marginal worker against

the hiring costs. Firms with limited access to capital have higher external financing costs than firms with good access to capital. All else being equal, firms with limited access to capital are likely to have larger hiring costs and fewer contemporary new hires associated with activity increases, due to the difficulty of raising external capital to fund the expansion.

2. Higher opportunity cost of capital: the discount rate used for calculating the present value of the revenue generated by the marginal worker should be the firm's opportunity cost of capital. Firms with limited access to capital have higher opportunity cost of capital than firms with good access to capital. All else being equal, firms with limited access to capital have the lower present value of revenue generated by the marginal worker. All other things being equal, firms with limited access to capital would have fewer contemporary new hires associated with activity increases. Similarly, to make firing decisions associated with activity decreases, managers trade the reduced present value of revenue generated by the marginal worker against current firing costs. All else being equal, firms with limited access to capital would fire more workers associated with activity decreases.

3. Higher costs to retain slack resource: one important explanation of cost stickiness is that managers retain slack resources not only to save on current period firing costs, but also to reduce future hiring costs if sales recover in subsequent periods (Weiss, 2010). When firms have limited access to capital, it would be more difficult to retain unutilized workers especially when activity decreases (Holzhacker et al., 2015). Opler et al. (1998) find that firms with limited access to capital tend to hold higher ratios of cash to total non-cash assets. Therefore, firms with high external financial costs may choose to remove excess capacity for the precautionary reason. All else being equal, firms with limited access to capital would retain less slack resources, which would reduce cost stickiness.

The above argument also applies when firms adjust their equipment and machines according to the activity changes. Importantly, adjustment costs of expanding capacity may involve securing external financing (Doms and Dune, 1998; Abowd and Kramarz, 2003), leading to very high adjustment costs associated with financing for firms with limited access to capital. And firms with limited access to capital have difficulty in keeping unutilized resources.

Although the effect of limited access to capital on cost stickiness depends on legal and financial institutions of individual economies, we argue that this effect may be more pronounced in China. Despite the high economic growth over the past few decades, China's financial markets are still less established than developed economies (Allen et al., 2005). For instance, only a small portion of large state-owned enterprises (SOEs) have received the approval for issuing public corporate bonds from the Chinese National Development and Reform Commission (NDRC). Private funds in China are only in the infant stage. Thus, bank loans are the main source of external financing for most Chinese firms. However, state-owned banks dominate Chinese credit market, and they have stringent credit rationing and strong lending discrimination against privately-held small and non-SOE firms (Bhabra et al., 2008; Li et al., 2009). As a result, it is much more difficult for privately-held small and non-SOE firms to obtain loans from Chinese state-owned banks than for publicly traded large and SOE firms.

In summary, compared to firms with better access to capital, firms with limited access to capital are likely to expand capacity less as sales increase, and reduce capacity more as sales decrease.[6] In other words, we expect limited access to capital to not only reduce contemporary

[6] Except for the above three aspects, limited access to capital may affect cost stickiness indirectly through the agency problem or managerial forecasts. For example, managers of firms with financial constraints have less free cash flows, and their incentives to retain redundant capacity are weaker, which leads to weaker cost stickiness. Similarly, managers of firms with financial constraints may be more pessimistic, which also leads to weaker cost stickiness. When we control for the agency problem or managerial forecasts in our empirical analysis, our results are robust.

capacity expansion associated with activity increase, but also lower the degree of cost stickiness. Thus, we have the following hypotheses:

Hypothesis 1: *Firms with limited access to capital have lower contemporary capacity expansion associated with sales increase.*

Hypothesis 2: *Firms with limited access to capital have lower degree of cost stickiness.*

3. Sample and data

3.1. Sample firm selection

We collect our sample from the Annual Industrial Survey Database, compiled by the National Bureau of Statistic of China (NBSC). The database covers all Chinese firms from 1998 to 2009 that have annual sales above RMB 5 million[7] and are in the mining and quarrying, manufacturing, and utility industries. We restrict our sample period to be 1998-2007 because the firm identification codes are no longer reliable after 2007 and this sample period is not influenced by the recent 2008 global financial crisis. In total, our sample includes 616,796 unique firms, with a total number of 2,228,727 firm-year observations. The NBSC mainly collect the firm characteristic data such as firm ownership, and accounting data such as total assets, total debts, sales, and operating profits. The accuracy of the data has been confirmed in the previous literature, for example, Chuang and Hsu (2004), Cull et al. (2009), and Li et al. (2009). The firms in our sample represent more than 90% of the industrial GDP of China, suggesting that it is important in its own to understand cost accounting practices of these firms.

[7] Some firms in the database do have annual sales lower than RMB 5 million. Our main results are robust if we exclude these firms from the sample.

The Annual Industrial Survey Database is suitable for our study on the relationship between access to capital and firm cost stickiness for three reasons. Frist, 99.8% of the firms in the database are privately held. Private firms have little access to equity markets and mainly rely on bank loan finance in China. Secondly, the firms in the database differ greatly in firm size. And most of them are small. Previous literature have documented that small and privately held firms have more difficulties to get bank loans from Chinese banks than stated-owned and publicly listed firms (Bhabra et al., 2008; Li et al., 2009). Therefore firms in our sample may have limited access to capital markets. Thirdly, our sample firms are located in 31 regions[8], which include 4 municipalities, 5 autonomous regions and 22 provinces. The levels of financial market development across these regions are quite different, which is suitable for our study on the effect of exogenous limited access to capital on cost stickiness.

Although privately-held small and non-SOE firms have limited access to capital, they might be affiliated with business groups and such structure provides internal capital market for those firms (e.g., Fan et al. 2011). Using an annual survey conducted by the China Securities Regulatory Commission (CSRC), which includes the information on each firm's group affiliation is from, He et al. (2013) find that business groups help member firms overcome constraints in raising external capital, and that the internal capital market within a business group is more likely to be an alternative financing channel among SOEs than among Non-SOEs. However, the majority of firms in our sample are non-SOEs, we show that when we limit our analyses to only non-SOEs, we still find the similar results. In addition, to the degree that the affiliation with a business group is stable over time, the inclusion of firm fixed effects in our regressions should mitigate the concern of the internal capital market within business groups. We still find the similar results after controlling for

[8] Firms in Hong Kong, Macau, and Taiwan are not included in our sample.

firm fixed effects. The other weakness of our sample is that we don't have detailed information for the measurement of access to capital used in literature studying public firms, such as firm-bank relationship.

Similar to Anderson et al. (2003) and other studies, we delete firms with duplicate IDs, observations with missing financial and operating information as well as information on a firm's ownership structure, and observations with errors such as non-positive total assets, non-positive sales etc. We also delete observations in which SG&A costs are greater than sales revenue in the same year, and observations without sales revenue or SG&A costs data for two consecutive years. Our final sample includes 242,703 firms and a total of 1,051,966 firm-year observations. SG&A costs,[9] sales revenue, and other financial variables for all firms in our sample are collected from the Annual Industrial Survey Database.

NBSC classify all firms covered in the Annual Industrial Survey Database into three main categories: mining and quarrying, manufacturing, and production and supply of electricity, gas and water. And NBSC further divide three main categories into thirty-nine industries based on each firm's 2-digit standard industry classification (SIC) applied. The detailed information on the each industry definition can be found in the appendix.

[9] We use the sum of sales costs and administration costs in the database to approximate SG&A costs. For industrial firms in 1998, joint-stock enterprises followed the Accounting System for Joint Stock Limited Enterprises, the others followed the Accounting System for Industrial Firms. Since 2001, all firms followed the Accounting System for Business Enterprises, with the Specific Accounting Standards for Business Enterprises as a supplement. Since 2005, the Accounting System of Small Enterprises has been introduced, and small firms can choose to follow either the Accounting System of Small Enterprises or the Accounting System for Business Enterprises. Although Chinese accounting system experienced several reforms during the period between 1998 and 2007, the definitions and main items of sales costs and administration costs are consistent across our sample period and across private versus publicly traded firms, and are comparable to those of SG&A costs in the US, except minor changes of items of administration costs in 2007. Since 2007, all firms began to follow the newly introduced Accounting Standards for Business Enterprises, which substitutes for the Accounting System for Business Enterprises and the Specific Accounting Standards for Business Enterprises. According to the 2007 Accounting Standards for Business Enterprises, bad debt expense is not included in administration costs in China any more, while it is included in SG&A costs in the US. Our results are robust when we delete the observations in 2007. In addition, we also examine the stickiness of property, plant and equipment (PP&E) costs, which are less subject to accounting disclosure and tax regulations in terms of SG&A change, and find the similar results.

3.2. Proxy for access to capital

Our study focuses on the relation between access to capital and cost stickiness. We use regional financial development as a proxy for access to capital, because previous studies find that regional financial development has a positive effect on firms' ability to raise fund externally. For example, Rajan and Zingales (1998) argue that well developed financial markets help a firm to mitigate moral hazard and adverse selection problems, hence lowering the firm's external financing cost. Consistent with this prediction, Rajan and Zingales (1998) find that industries that are reliant on external financing show greater growth in financially developed countries. Similarly, Demirgüç-Kunt and Maksimovic (1998) find that firm growth financed by long-term external debt and equity is positively associated with the level of a country's financial development. Love (2003) finds that firms in developed countries with better financial development have better access to external capital and thus higher investment. Beck et al. (2004) and Ayyagari et al. (2011) also find that financial development can mitigate a firm's limited access to capital in emerging economies.

Specifically, we use the regional financial market development index, compiled by the National Economic Research Institute of China, as an relatively exogenous proxy for access to capital.[10] The National Economic Research Institute of China develops five indices to measure regional marketization level: relationship between government and market; non-state owned economic market development; product marketization; factor market development; and market intermediary and law.[11]

[10] The index has been used by a number of prior studies (Wang et al., 2008; Firth et al., 2009; Li et al., 2009).

[11] Two principles are followed when these indices are established. At first, each of these five indices has at least two first level sub-indices. And each first-level sub-index can indicate one fundamental characteristic of marketization within a certain time period. Unreported techniques are applied to eliminate any non-market related noises in these indices. Second, every index is measurable and based on reliable and objective data sources. Survey data is also used if actual data is unavailable.

The financial market development index is one of the four first-level sub-indices of factor market development. It measures the degree of competition in each regional financial market. The financial market development index is composed by two second-level sub-indices: financial lending allocation index and financial competition index. The financial lending allocation index is measured by the proportion of loans received by non-state owned firms to the total loans from financial institution. And the financial competition index is measured by the ratio of amount deposited in non-state owned financial institutions to total amount deposited in all financial institutions.

To calculate each sub-index, the National Economic Research Institute of China set a base year. According to the raw scores of the region in a particular criterion, a region with the highest (lowest) scores receives an index value of 10 (0) in the base year. Then, for the rest of regions, their index value is calculated by:

$$Index_i = \frac{V_i - V_{\min}}{V_{\max} - V_{\min}} \times 10$$

where V_i is region raw score on criterion i, V_{max} is the highest raw score on criterion i, V_{min} is the lowest raw score in criterion i.

To compare the index value over time, index value after the base year is calculated by:

$$Index_{i,t} = \frac{V_{i,t} - V_{\min,0}}{V_{\max,0} - V_{\min,0}} \times 10$$

where subscript t represents year and subscript 0 represents base year.

The first-level indices are the weighted average of second-level sub-indices. Both arithmetic average and principal component analysis methods are applied when calculating the weights. Because the value of indices is very close between these two methods, only arithmetic average method has been used by the National Economic Research Institute of China since 2004. A higher

score of the index indicates more developed financial markets in the region, and better access to capital.

Although the regional financial development index does not directly measure access to capital at the firm-level, our approach offers a few advantages. Firstly, as the credit market in China is dominated by state-owned banks, macro-level factors such as monetary policy, government intervention, and financial development have significant effects on firms' external financing costs (Li et al., 2009; Chen et al., 2014). Secondly, our proxy of access to capital at the region level suffers less of endogenous concerns compared with proxies of access to capital at the firm-level, such as leverage. Thirdly, we focus on different regions in one country, and mitigate the confounding effects of cross-country differences in legal and political environments and accounting, tax, and financial policies. Finally, there are sufficient variations in financial developments across different regions in China. When China opened its economy in 1978, the Chinese government implemented an unbalanced development strategy. That is, to permit some people and some regions to become prosperous first, for the purpose of achieving common prosperity more quickly. Regions on the east coast of China received more favorable government policies and they also have geographical location advantages. Because of the higher return on investment on coastal regions, most domestic funds and foreign investments flew into these regions. As a result, the economic and financial development gap has been widened between the coastal and inland regions during our sample period.

3.3. Descriptions of the sample

The summary statistics of our sample are reported in Table 1. We winsorize all the accounting variables used in our empirical analyses on both sides by 0.5% to mitigate the possible

outlier effect.[12] In order to facilitate the comparison of our sample and those of prior studies, we use the descriptive statistics reported in Anderson et al. (2003) as benchmarks.

Panel A of Table 1 provides descriptive information about total assets, annual revenues and SG&A costs. Over the period between 1999 and 2007, the mean (median) of total assets is RMB 56.82 (18.20) million, the mean (median) of sales revenue is RMB 59.93 (23.13) million, and the mean (median) of SG&A costs is RMB 5.19 (1.83) million. We use the exchange rate of 1:6.57 in January 2011 to restate the numbers in the US dollar.[13] The results indicate that firms in our sample are much smaller than those studied in Anderson et al. (2003). For example, the average sales revenue (SG&A costs) is $1,277.09 ($229.45) million for their sample firms, about 140 times (290 times) as large as the average sales revenue (SG&A costs) of $9.12 ($0.79) million for our sample firms. Panel A of Table 1 also reports SG&A costs as the percentage of sales revenue. The results show that the average (median) of the percentage is 11.55% (8.17%). Although these numbers are smaller than the 26.41% (22.62%) reported in Anderson et al. (2003), they still suggest that SG&A costs are important to cost management. Our data offers a unique setting to examine cost management in a large sample with sufficient variations in firm size.

Panel B of Table 1 shows that sales revenue declines for 31.64% of the firm-year observations in our sample and SG&A costs decreases for 37.97% of the sample firm-year observations. Both of these numbers are greater than the corresponding numbers (27.01% and 24.98%) in Anderson et al. (2003), suggesting that decreases in sales and SG&A costs are more frequent in our sample than in Anderson et al. (2003). Similarly, the magnitudes of the decreases are also larger in our sample than in theirs. For example, the mean decreases in sales revenue and

[12] We also find the similar results when we use 1% to deal with the outliers.
[13] If we use exchange rate back in period 1999-2007, the firm size in our sample is even smaller because of the even higher exchange rate between the RMB and the US dollar.

SG&A costs in our sample are 23.14% and 26.55% respectively, whereas the corresponding numbers in their sample are 17.45% and 15.67%. In addition, sales decrease is smaller than SG&A decrease (23.14% vs. 26.55%) in our sample, while the opposite is true (17.5% vs. 15.67%) in the sample of Anderson et al. (2003). Finally, decreases in sales and SG&A costs are more volatile in our sample than in Anderson et al (2003). The standard deviation of the decrease in sales revenue (SG&A costs) is 20.27% (22.67%) in our sample and 18.64% (16.4%) in theirs, which might be explained by the fact that our sample firms are in an emerging market and face more volatile operating environment.

Panel C reports the summary statistics of the financial market index, and its two sub-indices: the financial lending allocation index and the financial competition index. The minimum value of both the financial market development index and the financial lending allocation index is 0. The financial market development index has a maximum value at 12.01 and the standard deviation of 2.42. And the financial lending index has a maximum value at 14.03 and the standard deviation of 3.31. The index value can be higher (lower) than 10 (0) in a given year, if the raw score of the index is larger (smaller) than the historical high (low). Panel D reports the summary statistics of our key variables across 31 regions. The results show significant variations in the indices across these regions.

4. Analysis and results

4.1. Main analysis

Previous cost stickiness studies (Calleja et al., 2006; Chen et al., 2012; Banker et al., 2013) normally use Anderson et al. (2003) regression as their basic model:

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + \gamma_1 * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + \lambda_1 * Decrease\_Dummy * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}]$$
$$+ \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t} \quad (1)$$

The intuition of this regression model is to test the significance of the marginal effect of sales decrease on the sensitivity of SG&A cost changes to the sales revenue changes. In this model, $Decrease\_Dummy_{i,t}$ is a binary variable, which is equal to 1 if sales revenue of firm *i* for period *t* decreases from period t-1, and 0 otherwise. The coefficient of *Decrease_Dummy* (λ_1) captures the direction of cost stickiness. When λ_1 is significantly negative, the increase in SG&A associated with 1% sales increase is γ_1 percent, while the decrease in SG&A costs associated with 1% sales decrease is $\gamma_1 + \lambda_1$ ($< \gamma_1$ percent), suggesting that SG&A costs are sticky. On the other hand, when λ_1 is significantly positive, the increase in SG&A costs associated with 1% sales increase is γ_1 percent, while the decrease in SG&A costs associated with 1% sales decrease is $\gamma_1 + \lambda_1$ ($> \gamma_1$ percent), suggesting that SG&A costs are anti-sticky. $Industry_{i,t}$ and $Year_{i,t}$ are industry and year dummy variables.

We use heteroskedasticity-consistent standard errors for all regressions in this study, because our sample includes a large number of firms with various firm characteristics. The first column in Panel A of Table 2 reports the results of model (1). Contrary to the previous findings that SG&A costs are sticky (e.g., Anderson et al. 2003), we find a significantly positive λ_1 in the whole sample, indicating that SG&A costs for our sample firms are anti-sticky. The estimated value of γ_1 is 0.5540, indicating that SG&A costs rise by 0.55% per 1% increase in sales revenue[14].

[14] Although the coefficients on γ1 is higher than that in Anderson et al. (2003), we argue that it is hard to compare the estimates of the two studies for a few reasons: 1) cross-sample comparisons of coefficients may not be appropriate, especially the within sample variable variances in our sample and Anderson et al. (2003)'s sample are different; 2) the definitions of the SG&A costs are not exactly the same between US and China; 3) we have public companies and SOEs, we re-estimate the coefficients after excluding these firms, and find the coefficient is lower than before; 4) legal and economic institutions are different between China and US.

The estimated value of λ_1 is 0.0117, indicating that SG&A costs fall by $\gamma_{1+} \lambda_1 = 0.5657$, or about 0.57% per 1% decrease in sales revenue. The results show that SG&A costs decrease significantly more when activity falls than they increase when activity rises by the same amount, indicating anti-stickiness of SG&A costs.

One possible explanation of cost anti-stickiness in our sample is that, as we discussed earlier, privately-held small and non-SOE firms have very limited access to external capital (Bhabra et al., 2008; Li et al., 2009). This situation is inconsistent with the implicit assumption made in prior studies that firms have sufficient access to capital (e.g., Anderson et al., 2003). To the credit of prior studies, which focus on publicly listed firms, this implicit assumption is more likely to be true, and these prior studies focus on other types of adjustment costs and expect the adjustment costs to be smaller for capacity expansion than for capacity reduction (e.g., Jaramillo et al., 1993; Pfann and Palm, 1993; Abowd and Kramarz, 2003). Consistent with this expectation, previous empirical evidence shows that costs are sticky (Anderson et al., 2003; Calleja et al., 2006). However, for those small private firms with limited access to capital, their costs may be less sticky or even anti-sticky on average.

Meanwhile, there are two alternative explanations for anti-sticky costs: (1) China's unique legal, economic institutions and industry characteristics may lead to cost anti-stickiness; (2) most of the sample firms are private. To rule out these two alternative explanations, we first collect all Chinese public firm data between 1998 and 2007 from China Stock Market & Accounting Research (CSMAR) database, and test our basic model (1) in this sample of Chinese public firms. Because the private firms in our sample are in three main industries (i.e., mining and quarrying, manufacturing, and production and supply of electricity, gas and water), we first test public firms that are also in these three industries. Next we test all public firms that are in the other industries.

The results in columns (2) – (4) of Panel A of Table 2 show cost stickiness in all Chinese public firms, suggesting that the anti-stickiness is unlikely to be driven by Chinese legal features and industry characteristics, since the legal features would apply to all Chinese firms, public and private, and the industry characteristics would affect to all firms in the same industries.

Second, we keep only private firms in our main sample and divide them into three subsamples by firm size, which is measured by the nature logarithm of total assets. We test the basic model (1) in these three subsamples. The results in Panel B of Table 2 show that, SG&A costs are anti-sticky in the small firm sample, not sticky in the median firm sample, and sticky in the large firm sample. These results suggest that being private (i.e., not publicly traded) alone does not warrant anti-stickiness. It is therefore unlikely that our finding is just driven by the fact that most of our sample firms are private.

To investigate the effect of access to capital on cost stickiness, we further specify γ_1 and λ_1 in model (1) as a function of the regional financial development index variable (RFD): [15]

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 RFD_{i,t}) * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 RFD_{i,t}) * Decrease\_Dummy * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t} \quad (2)$$

We use three different definitions of the *RFD* variable in model (2). *RFD1* is a dummy variable that is equal to 1 if a firm is located in a region with the financial development index above the sample median, and 0 otherwise. *RFD2* is the original value of the regional financial development index. And *RFD3* is the natural logarithm of the regional financial development index. Similar to Banker et al. (2013), we allow *RFD* to affect both the slope for revenue increases and the degree of cost stickiness in model (1). This is because access to capital may affect managerial decisions

[15] We find the similar results when including the interaction term between RFD and Decrease_Dummy in model (2).

when sales decrease as well as when sales increase. The coefficient γ_2 represents the effect of access to capital on the SG&A costs when sales increase. Our first hypothesis predicts γ_2 to be positive.

Our second hypothesis predicts λ_2 to be negative. Since λ_1 is generally positive and anti-stickiness prevails in our sample, a negative λ_2 implies that cost anti-stickiness becomes weaker as financial development reaches higher levels and firms have better access to capital. To express the same notion for stickiness, a negative λ_2 implies that cost stickiness becomes stronger as financial development reaches higher levels and firms have better access to capital.

The results of model (2) in Table 3 are consistent with our hypotheses. For all three definitions of the *RFD* variable, γ_2 is significantly positive, suggesting that in regions with higher levels of financial development, where firms have better access to capital, capacity expansion increases more as sales increase. In particular, γ_2 on *RFD1* is 0.0341, suggesting that when sales increase by 1%, SG&A costs of firms in the regions with the high financial market development index will grow 0.0341% more than the increase of SG&A costs of firms in the regions with the low financial market development index.

Similarly, λ_2 is significantly negative at 1% level, indicating that firms located in the regions with higher levels of financial development have weaker anti-stickiness, or stronger degree of cost stickiness. In particular, λ_2 on *RFD1* is -0.0652, suggesting that when sales decrease by 1%, SG&A costs of firms in the regions with high financial market development index will drop 0.0652% less than the decrease of SG&A costs of firms in the regions with low financial market development index[16].

[16] Among 1,051,966 firm-year observations in our sample, 322,292 firm-year observations are SOEs. We also separate our sample by SOEs and non-SOEs, and then test the model (2) in these two subsamples. We find that although in both SOEs and non-SOEs, λ_2 is significantly negative, the absolute value of λ_2 is significantly lower in SOEs than that in non-SOEs.

We also replace the *RFD* variable by the second-level sub-index of financial competition index (*RFC*) and financial lending allocation (*RLA*), and then re-estimate the model (2) in the full sample and non-SOE sample. As shown in Table 4, our results are robust with the *RLA* variable. However, λ_2 is not significant in the full sample when we replace the *RFD* variable by the *RFC* variable. The possible explanations are: (1) the financial competition may have both positive and negative effects on firms' access to capital (Petersen and Rajan, 1995; Guzman, 2000; Cetorelli and Gambera, 2001; Beck et al., 2004); (2) the financial competition index is measured as the ratio of the amount deposited in non-state owned financial institutions to the total amount deposited in all financial institutions. The index itself may not be a suitable proxy for access to capital.

As suggested by Anderson et al. (2003), we further extend model (2) by including the following four control variables: $Successive\_Decrease_{i,t}$, $Growth_{i,t}$, $AI_{i,t}$, and $EI_{i,t}$, respectively. Similar to Anderson et al. (2003), we define $Successive\_Decrease_{i,t}$ as a dummy variable equal to 1 if revenue in period *t*-1 is less than revenue in *t*-2, 0 otherwise. $Growth_{i,t}$ is the percentage growth in real Chinese GNP during year *t*. $AI_{i,t}$ is the asset intensity defined as the assets to sales revenue ratio. $EI_{i,t}$ is the employee intensity defined as the employees to sales revenue ratio. To control for the different economy growth rates across regions, we also include the percentage growth of real GNP in each region (*RGDP*) as a control variable. Table 5 shows that our results are robust to the inclusion of more control variables. The extended model in Table 5 is defined as:

$$\begin{aligned}\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] &= \beta_0 + (\gamma_1 + \gamma_2 RFD_{i,t} + \gamma_3 Successive\_Decrease_{i,t} + \gamma_4 Growth_t + \gamma_5 \log[AI_{i,t}] \\ &+ \gamma_6 \log[EI_{i,t}] + \gamma_7 \mathrm{RGNP}) * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 RFD_{i,t} + \lambda_3 Successive\_Decrease_{i,t} \\ &+ \lambda_4 Growth_t + \lambda_5 \log[AI_{i,t}] + \lambda_6 \log[EI_{i,t}] + \lambda_7 \mathrm{RGNP}) * Decrease\_Dummy * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] \\ &+ \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t} \qquad (3)\end{aligned}$$

In models (2) and (3), we simply define γ_1 and λ_1 in model (1) as a linear combination of the *RFD* variable and the other control variables. Following Banker et al. (2012), we test model (2) and model (3) using two-way clustering by region and by year.[17] Results reported in Table 6 are not consistent with our first hypothesis but are consistent with our second hypothesis. Although the coefficient of *RFD* (γ_2) is insignificant in a regression with two-way clustering by region and by year, the coefficient of *RFD* dummy (λ_2) is significantly negative, supporting that firms in the regions with high financial development index have higher cost stickiness.

Our results are still consistent with both hypotheses when we replace the *RFD* variable by the *RLA* variable in models (2) and (3). Table 7 shows that γ_2 on RLA is significantly positive, indicating that firms with better access to capital expands capacity more as sales increase. The results also show that λ_2 on *RLA* is significantly negative at the 1% level, which is consistent with our expectation that firms with better access to capital have higher cost stickiness. The results thus far have established a robust link between access to capital and cost stickiness. We next further validate our approach in a different way.

We take advantage of the 2004 Chinese macroeconomic regulation as an exogenous shock to firms' external financing costs. Between 1998 and 2003, the Chinese government remained its loose monetary and fiscal policy and kept stimulating the Chinese economy. As a result, by the end of 2003, Chinese economy was overheated. In response to this problem, at the beginning of 2004, the Chinese government issued a series of macroeconomic regulations and control policies that essentially tightened the regulations on lending and made it more difficult for firms to secure

[17] In our large panel data, we have firm observations over ten years and across 31 regions. It is natural to assume that error terms ($\varepsilon_{i,t}$) are correlated within each region and over the time dimension. We use the two-way clustered standard errors by region and by year based on the formula in Cameron and Miller (2011). In this paper, we assume that firms in regions with different financial development levels would have different ability to get access to capital. Therefore we choose to cluster error terms by region, instead of by firm itself. And our two-way clustering method is robust to an arbitrary pattern of within-region correlations and an arbitrary pattern of serial correlation within each region.

bank loans. We investigate the effect of the regulations on cost stickiness using a balanced panel sample from 2003 and 2004. [18] Specifically, we define *TLR* to be 1 for 2004 and 0 for 2003. Then we replace the regional financial development index variable by the TLR dummy variable in models (2) and (3). Because firms have more limited access to bank loans in 2004 than in 2003, we expect firms to have a lower degree of cost stickiness in 2004 relative to 2003. In addition, because the regulations mainly involve the industries of mining of ferrous metal ores (*In3*), mining of non-ferrous metal ores (*In4*), manufacture of textile (*In11*), manufacture and processing of ferrous metals (*In26*), and manufacture and processing of non-ferrous metals (*In27*), we expect the effect of the regulations to be stronger for these five industries than for the other industries.

The results in Table 8 indicate that for the full sample, the coefficient of *TLR* (γ_2) is significantly negative when control variables are not included and insignificant when control variables are included. And the coefficient of *TLR* dummy (λ_2) is always significantly positive, suggesting that firms in the period of more limited access to capital have lower cost stickiness. Further results in Table 8 show that these effects are more pronounced for the five industries that are more heavily influenced by the regulations on lending. These results confirm our hypotheses 1 and 2.

4.2. Further robustness checks

We also conduct a set of additional tests and find similar results.[19] These tests are based on

[18] As the instruments and target industries involved in the 2005 and 2006 Chinese macroeconomic regulation are different from those in the 2004 macroeconomic regulation, we only use the sample from 2003 and 2004 to examine the effect of the 2004 macroeconomic regulations.

[19] We also use the firm-level cost asymmetry measure in Weiss (2010), but do not find significant results. A possible reason is that when we adopt the Weiss (2010) cost asymmetry measure, we lose 97% of our observations, and only relatively large firms remain in the sample. While Weiss (2010) uses quarterly data, we only have yearly observations. To obtain the Weiss (2010) measure using yearly observations for a firm, the firm must 1) have data over at least three and up to five consecutive years, and 2) have sales and costs changing in the same direction. In our sample, only 3% of our firm-year observations, mainly from large firms, satisfy these two conditions simultaneously.

extensions of model (2), and are listed below: (1) We control for firm listing situation dummy, firm ownership type dummy, firm age, liquidity ratio, leverage, lagged changes in sales, product market competition[20], magnitude of sales changes and aggregate sales and costs over longer periods following Anderson et al. (2003). (2) Following Anderson and Lanen (2007), we control for industry dummies and allow the coefficients to change across industries. (3) We control for cost structure by using the revised model of Balakrishan et al. (2015). (4) Following the suggestions of Dierynck et al. (2012) and Kama and Weiss (2013), we control for managerial earnings management incentives. (5) We follow Banker et al. (2012a) to control for managerial expectations. (6) We follow Chen et al. (2012) to control for agency problem of empire building. We use uncertainty of future sales to proxy for agency problem of empire building, as in firms with high uncertainty of future sales, it maybe more difficult to monitor the managers. (7) To mitigate the concern of clustered errors and heteroskedasticity, we further cluster all regression standard errors by industry and use Huber-White robust standard error estimators within each industry. (8) We adjust the financial variables based on annual inflation rates. (9) We exclude the region with highest financial market development index value in each year.

5. Conclusions

Previous cost behavior literature studies publicly traded firms and document that costs are sticky (Anderson et al., 2003; Calleja et al., 2006; Chen et al., 2012; Banker et al., 2013). We extend the literature by examining whether the findings of prior studies hold for private firms with limited access to external capital. Using a large sample of Chinese private firms, we show that SG&A costs are on average anti-sticky. We also find that firms with limited access to capital have

[20] We use concentration50 ratio, which is defined as the market shares of the 50 largest firms over all the firms in the same industry, to proxy for product market competition.

lower contemporary capacity expansion associated with sales increase, as well as stronger cost anti-stickiness or weaker cost stickiness.

We contribute to the literature on cost behavior by showing how access to capital affects the direction and magnitude of cost stickiness. The results suggest that the stickiness of SG&A costs documented in prior studies that examine publicly traded, relatively large firms do not generalize to firms with limited access to capital, such as small and private firms in our sample. This finding is important given smaller firms play significant roles in many economies around the world. We also contribute to the literature by examining cost behavior in Chinese firms. Despite the increasing importance of Chinese economy, our understanding of cost accounting practice in China is limited. Nevertheless, like most prior studies, due to data availability limitation and the endogeneity problem we use regional financial development index as an relatively exogenous proxy and are unable to measure access to capital directly. Future studies may seek to link firm financing costs to adjustment costs more directly to generate new insight into how external financing costs affect cost stickiness. In addition, anti-sticky costs cannot be derived by limited access to capital ex-ante and anti-sticky costs may be caused by multiple factors, limited access to capital is just one of those factors. Future studies may seek to incorporate other factors to explain the anti-sticky costs.

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TABLE 1
Summary Statistics

Panel A : Distribution of Annual Revenue and SG&A Costs for Full Sample from 1999 to 2007

This table presents the distribution of annual revenue and SG&A costs for the full sample. All the reported numbers are in millions of RMB. We convert RMB value into US dollar value by using exchange rate 1:6.57 (as of 01/2011). The distribution of sales revenue and SG&A costs is for 1,050,270 firm-year observations during the period between 1999 and 2007 in the Chinese Annual Industrial Survey Database. The sample selection process is discussed in the paper.

	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
Total assets (RMB)	56.82	124.48	8.08	18.20	48.7
Sales revenue (RMB)	59.93	119.29	10.86	23.13	55.79
SG&A costs (RMB)	5.19	11.06	0.79	1.83	4.65
SG&A costs as a % of sales	11.55%	11.33%	4.32%	8.17%	14.71%
Total assets (Dollars)	8.65	18.95	1.23	2.77	7.41
Sales revenue (Dollars)	9.12	18.15	1.65	3.52	8.49
SG&A costs (Dollars)	0.79	1.68	0.12	0.28	0.71

Panel B : Periodic Fluctuations in Revenue and SG&A Costs for Full Sample from 1999 to 2007

This table presents the periodic fluctuations in revenue and SG&A costs for the full sample. In the first column, we report the percentage of firm year observations with a negative sales revenue growth rate and SG&A growth rate. In the other columns, we report summary statistics of observations with sales revenue and SG&A costs decline from the previous year.

	Percentage of Firm-years with Negative Percentage Change from Previous Period	Mean Percentage Decrease Across Periods	Standard Deviation of Percentage Decreases Across Periods	Lower Quartile of Percentage Decreases Across Periods	Median Percentage Decrease Across Periods	Upper Quartile of Percentage Decreases Across Periods
Sales revenue	31.64%	23.14%	20.27%	7.27%	17.45%	33.57%
SG&A costs	37.97%	26.55%	22.67%	8.52%	20.09%	39.09%

Panel C: Summary Statistics of Indices in the Whole Sample

This table presents the summary statistics of financial market index, financial lending allocation index and financial competition index in our whole sample from 1998-2007. The financial lending allocation index and financial competition index are the sub-indices of the financial market index.

	Mean	Std. Dev.	Min	Max
Financial Market Index	5.75	2.50	0.00	12.01
Financial Lending Allocation Index	6.06	3.26	0.00	14.03
Financial Competition Index	4.85	2.84	0.00	12.41

Panel D: Summary Statistics of Key Variables by 31 Regions

This table presents the number of observations and the average of our key variables by 31 regions. The sample period is from 1999 to 2007.

Region	Number of Obs	ln(Sales Ratio)	ln(Revenue Ratio)	GDP Growth	Financial Market Index	Financial Lending Allocation Index	Financial Competition Index
Beijing	32,462	9.69%	9.45%	11.84%	5.91	5.14	6.38
Tianjing	31,722	6.12%	6.40%	13.05%	6.37	5.83	6.81
Hebei	65,399	12.04%	18.51%	11.17%	6.76	7.28	6.13
Shanxi	27,204	14.50%	17.03%	11.55%	5.51	6.92	4.65
Neimenggu	13,956	14.25%	21.13%	15.04%	3.95	4.76	2.92
Liaoning	57,187	13.20%	19.74%	11.09%	7.06	5.98	7.83
Jilin	9,892	16.11%	24.20%	11.07%	4.09	2.34	5.49
Heilongjiang	17,515	5.21%	8.01%	10.18%	2.80	2.68	2.80
Shanghai	81,714	7.39%	8.93%	11.84%	9.19	7.77	10.10
Jiangsu	207,291	11.65%	15.27%	12.63%	8.33	10.90	6.75
Zhejiang	237,258	14.93%	13.40%	12.49%	9.60	10.58	8.73
Anhui	37,793	9.75%	12.91%	10.35%	5.98	6.96	5.25
Fujian	74,848	12.91%	14.69%	11.49%	6.43	9.48	4.24
Jiangxi	28,138	11.34%	22.66%	10.78%	4.84	5.53	4.28
Shandong	156,153	14.59%	24.45%	12.59%	7.75	7.18	7.97
Henan	63,070	4.10%	8.21%	11.23%	6.45	5.84	6.91
Hubei	51,152	8.92%	13.10%	10.70%	4.94	4.49	5.55
Hunan	49,056	14.28%	24.65%	10.61%	5.89	6.26	5.42
Guangdong	210,595	10.62%	12.54%	12.59%	8.31	8.81	3.44
Guangxi	21,007	10.18%	12.97%	10.67%	4.56	6.22	2.49
Hainan	3,577	4.50%	3.91%	10.49%	5.22	7.39	2.59
Chongqing	19,639	11.24%	12.58%	10.74%	7.77	6.91	8.24
Sichuan	50,768	13.09%	18.67%	10.78%	5.42	7.04	4.08
Guizhou	13,699	9.51%	10.65%	10.52%	4.26	4.52	3.95
Yunnan	16,614	7.54%	8.95%	9.06%	5.64	5.79	5.20
Xizang	829	9.11%	6.76%	11.84%	1.90	6.81	0.67
Shanxi	19,740	7.48%	10.25%	11.48%	6.16	6.77	5.93
Gansu	10,525	6.00%	10.25%	10.32%	4.35	4.76	4.22
Qinghai	2,335	11.17%	8.69%	11.35%	3.01	5.79	0.22
Ningxia	4,016	13.10%	14.25%	10.75%	6.05	6.40	5.60
Xinjiang	9,764	8.16%	8.14%	9.56%	3.65	5.28	2.00

TABLE 2

Panel A：Results of Regressing Changes in SG&A on Changes in Sales Revenue

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + \gamma_1 * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + \lambda_1 * Decrease\_Dummy * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + \sum_j \beta_j Industry_{i,t} + \sum_k \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue. The main sample includes 1,051,966 firm observations from the Annual Industrial Survey Database. We also include a sample of Chinese public firms for comparison. The full public sample includes 9,171 public firm-year observations during the period 1999-2007 (using CSMAR database). The matched industry sample includes all public firms from the same three industries as our main sample. *Decrease_Dummy*$_{i,t}$ is a dummy variable equal to 1 if the revenue of firm *i* for period *t* is less than that in the preceding period, and 0 otherwise. The coefficients of year and industry dummies are not reported. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

	Full sample	All public firms	Matched industries	Non-matched industries
β_0	0.0263***	0.1517***	0.2205***	0.1563***
	□5.07□	(4.30)	(3.36)	(3.94)
γ_1	0.5540***	0.4954***	0.5607***	0.4312***
	（237.78）	(32.18)	(26.24)	(19.27)
λ_1	0.0117***	-0.1569***	-0.2055***	-0.0988**
	（2.67）	(-4.98)	(-4.56)	(-2.21)
Adjusted R^2	0.1995	0.1663	0.1618	0.1752
N	1,051,966	9,171	5,672	3,499

Panel B : Results of Regressing Changes in SG&A on Changes in Sales Revenue in Three Sub-groups of Firms

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + \gamma_1 * \log[\frac{\text{Revenue}_{i,t}}{\text{Revenue}_{i,t-1}}] + \lambda_1 * Decrease\_Dummy * \log[\frac{\text{Revenue}_{i,t}}{\text{Revenue}_{i,t-1}}] + \sum_j \beta_j Industry_{i,t} + \sum_k \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue. We keep only private firms in our main sample and divide them into three groups by firm size. $Size_{i,t}$ is the nature logarithm of total assets of firm i for period t. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm *i* for period *t* is less than that in the preceding period, and 0 otherwise. The coefficients of year and industry dummies are not reported. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

	Small Firms	Median Firms	Large Firms
β_0	0.0192*	0.0218***	0.0455***
	(1.79)	(2.52)	(6.48)
γ_1	0.4939***	0.5465***	0.6008***
	(101.46)	(136.56)	(172.76)
$\boldsymbol{\lambda_1}$	0.1420***	0.0113	-0.0925***
	(16.59)	(1.51)	(-13.49)
Adjusted R^2	0.1666	0.1946	0.2405
N	289,708	356,279	400,307

TABLE 3

Results of Regressing Changes in SG&A on Changes in Sales Revenue Including the Effect of Access to Capital

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 RFD_{i,t}) * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 RFD_{i,t}) * Decrease\_Dummy * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue including the effect of access to capital. The full sample includes 1,051,966 firm-year observations during the period 1999-2007. $RFD1_{i,t}$ is a dummy variable equal to 1 if a firm is located in a region with financial development index above the sample median, and 0 otherwise. $RFD2_{i,t}$ is the original value of regional financial development index. $RFD3_{i,t}$ is natural logarithm of regional financial development index. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm *i* for period *t* is less than that in the preceding period, and 0 otherwise. The coefficients of year and industry dummies are not reported. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

	RFD1	RFD2	RFD3
β_0	0.0316***	0.0363***	0.0312***
	（6.28）	（7.13）	（6.14）
γ_1	0.5403***	0.5130***	0.5294***
	（190.81）	（71.08）	（49.41）
γ_2	**0.0341*** **	**0.0052*** **	**0.0122** **
	（9.46）	**（6.15）**	**（2.37）**
λ_1	0.0374***	0.0992***	0.0666***
	（7.20）	（8.21）	（3.97）
λ_2	**-0.0652*** **	**-0.0115*** **	**-0.0280*** **
	（-9.92）	**（-7.77）**	**（-3.40）**
Adjusted R^2	0.1997	0.1996	0.1995
N	1,051,966	1,051,966	1,051,966

TABLE 4

Results of Regressing Changes in SG&A on Changes in Sales Revenue Including the Financial Competition and Financial Lending Sub-indexes

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 FC/FL_{i,t}) * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 FC/FL_{i,t}) * Decrease\_Dummy * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}] + \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue including the effect of access to capital and regional economic development. The sample period is 1999-2007. $FC/FL_{i,t}$ are two dummy variables equal to 1 if a firm is located in regions with financial competition/financial lending index above the sample median, and 0 otherwise. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm i for period t is less than that in the preceding period, and 0 otherwise. We estimate the regressions in the total sample and Non-SOE sample. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

	Financial Competition		Financial Lending	
	full sample	Non-SOEs	full sample	Non-SOEs
β_0	0.0282***	0.0140**	0.0333***	0.0217***
	（5.61）	（2.31）	（6.61）	（3.57）
γ_1	0.5507***	0.5520***	0.5320***	0.5319***
	（202.52）	（237.50）	（185.25）	（228.41）
γ_2	**0.0084****	**0.0020**	**0.0577*****	**0.0510*****
	(2.30)	**(0.66)**	**（6.48）**	**（16.61）**
λ_1	0.0122**	0.0282***	0.0349***	0.0588***
	（2.41）	（6.10）	（6.48）	（12.01）
λ_2	**-0.0015**	**-0.0093***	**-0.0638*****	**-0.0801*****
	(-0.22)	**(-1.66)**	**（-9.83）**	**（-13.25）**
Adjusted R^2	0.1995	0.1906	0.1999	0.1909
N	1,051,966	729,674	1,051,966	729,674

TABLE 5

Results of Regressing Changes in SG&A on Changes in Sales Revenue Including the Effect of Access to Capital and Regional Economic Development

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 RFD_{i,t} + \gamma_3 Successive\_Decrease_{i,t} + \gamma_4 Growth_t + \gamma_5 \log[AI_{i,t}] + \gamma_6 \log[EI_{i,t}] + \gamma_7 \mathrm{RGNP}) * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 RFD_{i,t} + \lambda_3 Successive\_Decrease_{i,t} + \lambda_4 Growth_t + \lambda_5 \log[AI_{i,t}] + \lambda_6 \log[EI_{i,t}] + \lambda_7 \mathrm{RGNP}) * Decrease\_Dummy * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue including the effect of access to capital and regional economic development. The full sample includes 691,045 firm-year observations during the period 1999-2007. $RFD1_{i,t}$ is a dummy variable equal to 1 if a firm is located in regions with financial development index above the sample median, and 0 otherwise. $RFD2_{i,t}$ is the original value of regional financial development index. $RFD3_{i,t}$ is nature logarithm of regional financial development index. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm i for period t is less than that in the preceding period, and 0 otherwise. $Successive\_Decrease_{i,t}$ is a dummy variable equal to 1 if the revenue in period *t*-1is less than the revenue in *t*-2, and 0 otherwise. $Growth_{i,t}$ is the percentage growth in real GNP during year *t*. $AI_{i,t}$ is asset intensity defined as assets to sales revenue. $EI_{i,t}$ is employee intensity defined as employees to sales revenue. $RGNP_{i,t}$ is the percentage growth in real GNP in each region. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

	RFD1	RFD2	RFD3
β_0	0.0439*** (7.08)	0.0480*** (7.70)	0.0455*** (7.31)
γ_1	0.6305*** (32.33)	0.6238*** (31.93)	0.5982*** (28.06)
γ_2	**0.0244*** (4.88)**	**0.0081*** (5.62)**	**0.0319*** (3.36)**
γ_3	-0.1110*** (-21.65)	-0.1103*** (-21.51)	-0.1104*** (-21.54)
γ_4	-0.2261** (-2.41)	-0.4228*** (-4.56)	-0.3842*** (-4.16)
γ_5	-0.0061*** (-2.55)	-0.0055** (-2.31)	-0.0057** (-2.39)
γ_6	0.0823 (0.24)	0.1415 (0.42)	0.1041 (0.31)
γ_7	-0.3053* (-1.75)	-0.4398** (-2.40)	-0.2885 (-1.57)
λ_1	-0.1221*** (-3.80)	-0.1113*** (-3.46)	-0.0757** (-2.20)
λ_2	**-0.0649*** (-7.41)**	**-0.0136*** (-5.58)**	**-0.0424*** (-2.94)**
λ_3	0.1708*** (20.21)	0.1691*** (20.02)	0.1688*** (19.98)
λ_4	-0.2026 (-1.18)	0.2347 (1.39)	0.1609 (0.96)
λ_5	0.0046* (1.74)	0.0041 (1.57)	0.0045* (1.70)
λ_6	0.4685 (1.24)	0.4381 (1.16)	0.5069 (1.34)
λ_7	1.1834*** (3.93)	1.1985*** (3.78)	0.8308*** (2.64)
Adjusted R^2	0.1782	0.1781	0.1781
N	691,045	691,045	691,045

TABLE 6

Results of Regressing Changes in SG&A on Changes in Sales Revenue with Two Way Clustering Standard Errors by Region and Year

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 RFD1_{i,t} + \gamma_3 Successive\_Decrease_{i,t} + \gamma_4 Growth_t + \gamma_5 \log[AI_{i,t}] + \gamma_6 \log[EI_{i,t}] + \gamma_7 \mathrm{RGNP}) * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 RFD1_{i,t} + \lambda_3 Successive\_Decrease_{i,t} + \lambda_4 Growth_t + \lambda_5 \log[AI_{i,t}] + \lambda_6 \log[EI_{i,t}] + \lambda_7 \mathrm{RGNP}) * Decrease\_Dummy * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue including the effect of access to capital and clustering standard errors by region and year. The full sample includes 1,051,966 firm-year observations during the period 1999-2007. $RFD1_{i,t}$ is a dummy variable equal to 1 if a firm is located in regions with financial development index above the sample median, and 0 otherwise. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm i for period t is less than that in the preceding period, and 0 otherwise. $Successive\_Decrease_{i,t}$ is a dummy variable equal to 1 if the revenue in period *t*-1is less than the revenue in *t*-2, and 0 otherwise. $Growth_{i,t}$ is the percentage growth in real GNP during year *t*. $AI_{i,t}$ is asset intensity defined as assets to sales revenue. $EI_{i,t}$ is employee intensity defined as employees to sales revenue. $RGNP_{i,t}$ is the percentage growth in real GNP in each region. The standard errors of all the regressions are clustered by region and by year. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

β_0	0.0316**	0.0439***
	(2.37)	(3.59)
γ_1	0.5403***	0.6305***
	(12.45)	(8.85)
γ_2	**0.0341**	**0.0244**
	(1.16)	**(0.49)**
γ_3		-0.1110***
		(-5.98)
γ_4		-0.2261*
		(-1.65)
γ_5		-0.0061
		(-0.76)
γ_6		0.0823
		(0.11)
γ_7		-0.3053
		(-0.66)
λ_1	0.0374*	-0.1221**
	(1.87)	(-2.08)
λ_2	**-0.0652*** **	**-0.0649** **
	(-2.97)	**(-2.45)**
λ_3		0.1708***
		(7.74)
λ_4		-0.2026
		(-1.21)
λ_5		0.0046
		(0.63)
λ_6		0.4685
		(0.62)
λ_7		1.1834**
		(2.49)
Adjusted R^2	0.1997	0.1782
N	1,051,966	691,045

TABLE 7

Results of Regressing Changes in SG&A on Changes in Sales Revenue Including the Effect of Access to Capital by Using Regional Lending Allocation Index

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 RLA_{i,t} + \gamma_3 Successive\_Decrease_{i,t} + \gamma_4 Growth_t + \gamma_5 \log[AI_{i,t}]$$
$$+ \gamma_6 \log[EI_{i,t}] + \gamma_7 \mathrm{RGNP}) * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}] + (\lambda_1 + \lambda_2 RLA_{i,t} + \lambda_3 Successive\_Decrease_{i,t}$$
$$+ \lambda_4 Growth_t + \lambda_5 \log[AI_{i,t}] + \lambda_6 \log[EI_{i,t}] + \lambda_7 \mathrm{RGNP}) * Decrease\_Dummy * \log[\frac{\mathrm{Re}venue_{i,t}}{\mathrm{Re}venue_{i,t-1}}]$$
$$+ \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue including the effect of access to capital by using regional lending allocation index. The full sample includes 1,051,966 firm-year observations during the period 1999-2007. $RLA_{,t}$ is a dummy variable equal to 1 if a firm is located in regions with lending allocation index above the sample median, and 0 otherwise. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm i for period t is less than that in the preceding period, and 0 otherwise. $Successive\_Decrease_{i,t}$ is a dummy variable equal to 1 if the revenue in period *t*-1is less than the revenue in *t*-2, and 0 otherwise. $Growth_{i,t}$ is the percentage growth in real GNP during year *t*. $AI_{i,t}$ is asset intensity defined as assets to sales revenue. $EI_{i,t}$ is employee intensity defined as employees to sales revenue. $RGDP_{i,t}$ is the percentage growth in real GNP in each region. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

β_0	0.0333***	0.0482***
	(6.61)	(7.76)
γ_1	0.5321***	0.6422***
	(85.25)	(82.78)
γ_2	**0.0577****	**0.0678****
	(6.27)	**(3.62)**
γ_3		-0.1115***
		(-21.76)
γ_4		-0.1255
		(-1.35)
γ_5		-0.0050**
		(-2.10)
γ_6		0.0134
		(0.04)
γ_7		-0.6674***
		(-3.78)
λ_1	0.0349***	-0.1299***
	(6.48)	(-4.02)
λ_2	**-0.0638****	**-0.0719****
	(-9.83)	**(-8.30)**
λ_3		0.1694***
		(20.07)
λ_4		-0.1373
		(-0.81)
λ_5		0.0039
		(1.46)
λ_6		0.6086*
		(1.62)
λ_7		1.1786***
		(3.89)
Adjusted R^2	0.1999	0.1785
N	1,051,966	691,045

TABLE 8

Results of Regressing Changes in SG&A on Changes in Sales Revenue Including the Effect of Access to Capital by Using Tight Lending Regulation Dummy

$$\log[\frac{SG\&A_{i,t}}{SG\&A_{i,t-1}}] = \beta_0 + (\gamma_1 + \gamma_2 TLR_t + \gamma_3 Successive\_Decrease_{i,t} + \gamma_4 \log[AI_{i,t}] + \gamma_5 \log[EI_{i,t}]) * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}]$$

$$+ (\lambda_1 + \lambda_2 TLR_t + \lambda_3 Successive\_Decrease_{i,t} + \lambda_4 \log[AI_{i,t}] + \lambda_5 \log[EI_{i,t}]) * Decrease\_Dummy * \log[\frac{\text{Re}venue_{i,t}}{\text{Re}venue_{i,t-1}}]$$

$$+ \sum_{j=1}^{38} \beta_j Industry_{i,t} + \sum_{k=39}^{46} \beta_k Year_{i,t} + \varepsilon_{i,t}$$

This table presents the results of regressing changes in SG&A on changes in sales revenue including the effect of access to capital by using tight lending regulation dummy. The full balanced sample includes 142,730 firm-year observations during the period from 2003 to 2004. TLR_t is a dummy variable equal to 1 if the sub-period is 2004, and 0 otherwise. $Decrease\_Dummy_{i,t}$ is a dummy variable equal to 1 if the revenue of firm i for period t is less than that in the preceding period, and 0 otherwise. $Successive\_Decrease_{i,t}$ is a dummy variable equal to 1 if the revenue in period t-1is less than the revenue in t-2, and 0 otherwise. $AI_{i,t}$ is asset intensity defined as assets to sales revenue. $EI_{i,t}$ is employee intensity defined as employees to sales revenue. The standard errors of all the regressions are estimated by Huber-White sandwich estimators. ***, **,* indicate significance at the 1%, 5%, and 10% levels, respectively.

	full sample	full sample	regulated industries	regulated industries	non-regulated industries	non-regulated industries
β_0	0.0885***	0.0877***	0.0768*	0.0745	0.1073***	0.1096***
	（6.99）	（6.44）	（1.64）	（1.43）	（7.43）	（7.08）
γ_1	0.5989***	0.6080***	0.6057***	0.5613***	0.5983***	0.6148***
	（74.80）	（51.93）	（33.76）	（19.23）	（93.20）	（64.18）
γ_2	**-0.0559*** **	**-0.0063**	**-0.1154*** **	**-0.0194**	**-0.0472*** **	**-0.0087**
	（-4.59）	**（-0.47）**	**（-4.37）**	**（-0.62）**	**（-4.92）**	**（-0.34）**
γ_3		-0.1216***		-0.1517***		-0.1171***
		（-11.20）		（-6.27）		（-13.77）
γ_4		-0.0143***		-0.0210		-0.0139***
		（-2.65）		（-1.44）		（-3.40）
γ_5		-0.5577		3.4868*		-1.0311*
		（-0.77）		（1.60）		（-1.65）
λ_1	-0.0949***	-0.1069***	-0.2053***	-0.1197**	-0.0827***	-0.1097***
	（-5.18）	（-4.28）	（-4.60）	（-1.99）	（-5.75）	（-5.61）
λ_2	**0.1413*** **	**0.0807*** **	**0.3428*** **	**0.2128*** **	**0.1154*** **	**0.0648*** **
	（5.70）	**（2.98）**	**（6.10）**	**（3.35）**	**（6.08）**	**（3.11）**
λ_3		0.1511***		0.0843*		0.1601***
		（7.45）		（1.84）		（10.32）
λ_4		0.0234***		0.0524***		0.0202***
		（3.66）		（3.15）		（4.17）
λ_5		-0.8733		-8.8146		0.1368
		（-0.96）		（-3.51）		（0.18）
Adjusted R^2	0.2005	0.1904	0.1899	0.1737	0.2020	0.1929
N	142,730	126,554	16,444	14,445	126,286	112,109

Appendix: ***Industry Variable Definition and the Corresponding Name***
The classification is according to 2-digit SIC applied by the NBSC in 2002.

Industry	**Variable definition**	**Corresponding Name of Each Industry**
Mining and quarrying	In1	Mining and washing of coal
	In2	Extraction of petroleum and natural gas
	In3	Mining of ferrous metal ores
	In4	Mining of non-ferrous metal ores
	In5	Mining and processing of nonmetal ores
	In6	Mining of other ores n.e.c
Manufacturing	In7	Processing of food from agricultural products
	In8	Manufacture of foods
	In9	Manufacture of beverage
	In10	Manufacture of tobacco
	In11	Manufacture of textile
	In12	Manufacture of textile wearing apparel, footwear, and caps
	In13	Manufacture of leather, fur, feather and its products
	In14	Processing of timbers, manufacture of wood, bamboo, rattan, palm, and straw products
	In15	Manufacture of furniture
	In16	Manufacture of paper and paper products
	In17	Printing, reproduction of recording media
	In18	Manufacture of articles for culture, education and sport activity
	In19	Processing of petroleum, coking, processing of nucleus fuel
	In20	Manufacture of chemical raw material and chemical products
	In21	Manufacture of medicines
	In22	Manufacture of chemical fiber
	In23	Manufacture of rubber
	In24	Manufacture of plastic
	In25	Manufacture of non-metallic mineral products
	In26	Manufacture and processing of ferrous metals
	In27	Manufacture and processing of non-ferrous metals
	In28	Manufacture of metal products
	In29	Manufacture of general purpose machinery
	In30	Manufacture of special purpose machinery
	In31	Manufacture of transport equipment
	In32	Manufacture of electrical machinery and equipment
	In33	Manufacture of communication equipment, computer and other electronic equipment
	In34	Manufacture of measuring instrument and machinery for cultural activity and office work
	In35	Manufacture of artwork, other manufacture n.e.c
	In36	Recycling and disposal of waste
Production and supply of electricity, gas and water	In37	Production and supply of electric power and heat power
	In38	Production and distribution of gas
	In39	Production and distribution of water